

What is claimed is:

1. A method for operating an implantable medical device, comprising:
5 sensing electrical activity in a cardiac chamber and generating a chamber sense signal when the sensed electrical activity exceeds a predetermined threshold;
measuring time intervals between each pair of successive chamber senses, referred to as BB intervals, the measured BB intervals constituting an BB time series;
filtering the BB intervals to exclude those BB intervals which are greater or less
10 than a statistic computed from a plurality of preceding BB intervals by a specified threshold value, the excluded BB intervals being deemed to be ectopic BB intervals which are due to ectopic cardiac activity; and,
computing a heart rate variability metric from the filtered BB intervals.
- 15 2. The method of claim 1 wherein the statistic is a median value of the plurality of preceding BB intervals.
3. The method of claim 1 wherein the statistic is a weighted average of the plurality of preceding BB intervals.
- 20 4. The method of claim 1 wherein the chamber senses are ventricular senses and the BB intervals are RR intervals.
5. The method of claim 1 wherein the specified threshold value is a specified
25 number.
6. The method of claim 1 wherein the specified threshold value is a specified percentage of the computed statistic.

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7. The method of claim 1 further comprising filtering the BB intervals by:
evaluating a present BB interval by comparing the present BB interval to a
statistic computed from the plurality of previous BB intervals stored in a first-in-first-out
buffer, where the buffer contains a maximum number N of preceding BB intervals;
5 excluding the present BB interval as an ectopic interval if the present BB interval
is greater or less than the computed statistic by the specified threshold value; and,
updating the buffer after each BB interval is evaluated.

8. The method of claim 7 further comprising updating the buffer by removing the
10 oldest interval and storing the present BB interval therein if the present BB interval was
not excluded as ectopic.

9. The method of claim 1 further comprising filtering the BB intervals by:
excluding the present BB interval as ectopic if the present BB interval is above or
15 below specified upper and lower limit values;
excluding the present BB interval as indeterminate if a first-in-first-out buffer for
containing a maximum number N of preceding BB intervals contains less than N
intervals;
if the buffer contains N intervals, computing a median value of the plurality of
20 previous BB intervals stored in the buffer;
excluding the present BB interval as ectopic if the present BB interval is greater or
less than the computed median value by the specified threshold value; and,
updating the buffer after each BB interval is evaluated by:
if the present BB interval was not ectopic, removing the oldest interval from the
25 buffer if the buffer contains N intervals and storing the present BB interval therein; and,
if the present BB interval was ectopic, removing the oldest interval from the
buffer if the buffer contains at least one interval.

10. The method of claim 9 wherein the number N is three.

11. The method of claim 1 wherein the heart rate variability metric is a parameter computed by time-domain filtering of the filtered BB intervals.

12. The method of claim 1 wherein the heart rate variability metric is a parameter
5 computed by frequency domain analysis of the filtered BB intervals.

13. The method of claim 1 wherein the heart rate variability metric is a statistical surrogate of a frequency component of the filtered BB intervals.

10 14. The method of claim 1 further comprising maintaining a count of the number of detected ectopic beats.

15. A cardiac rhythm management device, comprising:

a sensing channel for sensing electrical activity in a cardiac chamber;

15 a controller interfaced to the sensing channel which detects a chamber sense when the sensed electrical activity exceeds a predetermined threshold;

wherein the controller is programmed with executable instructions for:

measuring time intervals between each pair of successive chamber senses, referred to as BB intervals, the measured BB intervals constituting an BB time series;

20 filtering the BB intervals to exclude those BB intervals which are greater or less than a statistic computed from a plurality of preceding BB intervals by a specified threshold value, the excluded BB intervals being deemed to be ectopic BB intervals which are due to ectopic cardiac activity; and,

computing a heart rate variability metric from the filtered BB intervals.

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16. The device of claim 15 wherein the statistic is a median value of the plurality of preceding BB intervals.

17. The device of claim 15 wherein the statistic is a weighted average of the plurality
30 of preceding BB intervals.

18. The device of claim 15 wherein the chamber senses are ventricular senses and the BB intervals are RR intervals.

5 19. The device of claim 15 wherein the specified threshold value is a specified number.

20. The device of claim 15 wherein the specified threshold value is a specified percentage of the computed statistic.

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21. The device of claim 15 wherein the controller is programmed to filter the BB intervals by:

evaluating a present BB interval by comparing the present BB interval to a statistic computed from the plurality of previous BB intervals stored in a first-in-first-out
15 buffer, where the buffer contains a maximum number N of preceding BB intervals;

excluding the present BB interval as an ectopic interval if the present BB interval is greater or less than the computed statistic by the specified threshold value; and,
updating the buffer after each BB interval is evaluated.

20 22. The device of claim 21 wherein the controller is programmed to update the buffer by removing the oldest interval and storing the present BB interval therein if the present BB interval was not excluded as ectopic.

23. The device of claim 15 wherein the controller is programmed to filter the BB
25 intervals by:

excluding the present BB interval as ectopic if the present BB interval is above or below specified upper and lower limit values;

excluding the present BB interval as indeterminate if a first-in-first-out buffer for containing a maximum number N of preceding BB intervals contains less than N
30 intervals;

if the buffer contains N intervals, computing a median value of the plurality of previous BB intervals stored in the buffer;

excluding the present BB interval as ectopic if the present BB interval is greater or less than the computed median value by the specified threshold value; and,

5 updating the buffer after each BB interval is evaluated by:

if the present BB interval was not ectopic, removing the oldest interval from the buffer if the buffer contains N intervals and storing the present BB interval therein; and,

if the present BB interval was ectopic, removing the oldest interval from the buffer if the buffer contains at least one interval.

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24. The device of claim 23 wherein the number N is three.

25. The device of claim 15 wherein the heart rate variability metric is a parameter computed by time-domain filtering of the filtered BB intervals.

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26. The device of claim 15 wherein the heart rate variability metric is a parameter computed by frequency domain analysis of the filtered BB intervals.

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27. The device of claim 15 wherein the heart rate variability metric is a statistical surrogate of a frequency component of the filtered BB intervals.

28. The device of claim 15 wherein the controller is programmed to maintain a count of the number of detected ectopic beats.

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